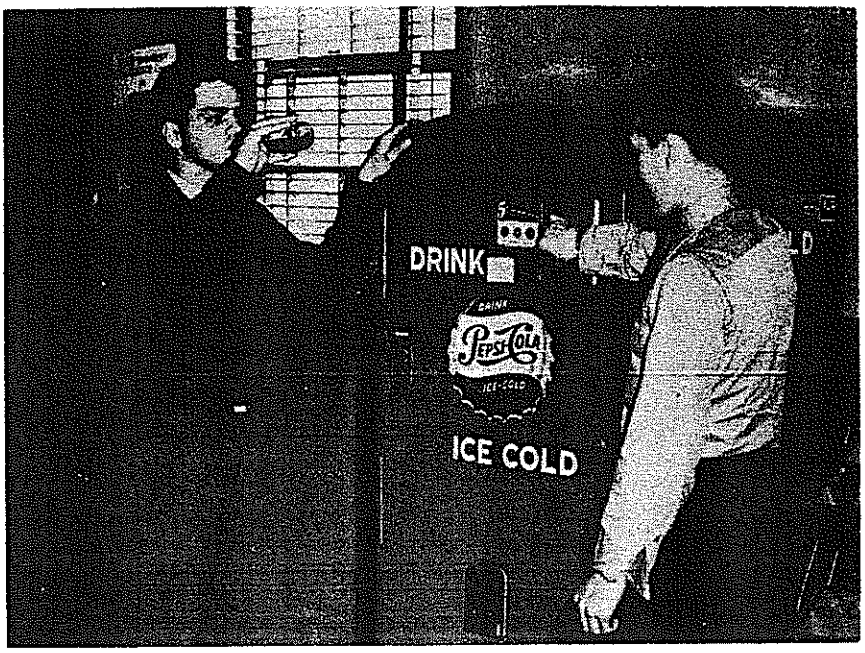

BY JAMES O. DUNSTON

In Europe It's Called Mineral Water—Americans Call It Pop—But Everywhere It's BIG Business

The Fizzle that Founded an Industry

WITH THE ADVENT of hot weather the substantial year-round sale of soft drinks usually skyrockets to new heights. That sudden upturn in business always renews many age-old questions in the minds of the dealers and consumers alike—"Who ever got the idea of putting carbon dioxide gas into beverages, anyway."

Some of the questions may be of a more timely nature, such as, "How are those new canned drinks working out?" or "What is meant by low-calorie beverages?" Many books could be written in answer to these and the various other questions which may arise. The purpose of this article, however, is to provide the exchange and commissary operator with a fundamental understanding of the nature of that fast-moving item of merchandise known as the carbonated beverage.

While the carbonated soft drink as we know it today is a comparatively recent innovation, it has a dynamic background dating into ancient history.

For millenniums, people the world over have visited mineral springs for the purpose of drinking the water or bathing in it, or both. Europe is especially noted for its many spas and watering places. In some of the mineral springs and wells the water is constantly bubbling due to carbon dioxide gas which comes out of the earth with the water. To the ancients this bubbling presented a rather mysterious phenomenon. Perhaps they thought it was caused by air in the water or maybe they just accepted it as one of those inscrutable gifts of nature. Regardless of the cause of the bubbling and regardless of whether or not it had any therapeutic value, people liked to drink the effervescent water.

IT IS SAID that when the mountain did not come to Mohammed, he simply solved the problem by going to the mountain. For the multitudes of people who wanted to drink mineral water, things were not so easy. They were not always in a position to go to the spas whenever they pleased. For that reason, various scientists of their day began trying to simulate bubbling mineral water so that it could be made readily available to the masses of people at all times, wherever they might happen to be.

One of the pioneers in this field was Jean Baptiste van Helmont, a noted Belgian chemist, physiologist and physician. Van Helmont demonstrated that the bubbling in mineral water was caused by the same gas that formed during alcoholic fermentation, during the chemical reaction of acids on chalk and during the burning of carbon.

In 1685, Fredrick Hoffman, a German chemist and physician, theorized that effervescent mineral water could be prepared by mixing a solution of sulfuric acid with a suitable carbonate, then shaking the mixture in a closed container to cause absorption of the gas in the liquid.

VARIOUS OTHER SCIENTISTS conducted experiments along this line and proved conclusively that the process would work. Effervescent water was definitely produced but there was one objectionable feature. Salt, which was formed by the reaction of the acid with the alkali remained in the water. This imparted an objectionable flavor to the water.

The next problem was to separate the carbon dioxide entirely from the reaction solution and then reincorporate the gas into fresh water. Several scientists worked concurrently toward that end and it is not known for sure just which one was the first to be successful. The discovery is usually credited, however, to Joseph Priestly, an English Nonconformist minister, who wrote many famous works on religion and politics. For recreation, Priestly studied electricity and chemis-

About the Author . . .

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He has written this article especially for THE MILITARY MARKET. It is of special interest to exchange and commissary operators since it deals with the historical and technical aspects of one of the largest resale items —soft drinks.

try, in which fields he made numerous scientific contributions.

In 1772, Priestly published a pamphlet entitled, "Directions for Impregnating Water with Fixed Air." The "fixed air" was actually carbon dioxide which he generated by the action of acid on limestone. In the pamphlet he pointed out that the gas is absorbed in water much better when under pressure. He allowed the gas to escape from the solution of reaction, then forced it into fresh water, using a rubber bulb to produce the pressure.

THUS BEGAN THE age of artifically carbonated water which was to grow into a multimillion dollar industry. It is interesting to note, however, that in some parts of Europe today, the modern carbonated beverage is still affectionately known as "mineral water."

Under ordinary atmospheric conditions, carbon dioxide is a gas. It has a molecular weight of 44.01. It is colorless, almost odorless and has a rather biting taste. By controlled changes in temperature and pressure, the gas can be reduced to the liquid or solid phase. Solid carbon dioxide is popularly known as dry ice.

Today's methods of producing carbon dioxide and incorporating it into water are a far cry from Priestly's **in vitro** experiments of almost two centuries ago. The modern carbon dioxide manufacturing plant is operated under highly scientific control. In some plants the gas is obtained as a by-product from certain industrial processes. In others it is made by the direct combustion of carbon in fuels such as coke, oil or natural gas. Regardless of its source, the final product is always thoroughly cleaned and purified. For convenience in handling, the gas is reduced to the liquid or solid phase before shipping to the bottling plant.

THE PROCESS OF saturating water with carbon doxide is known as carbonation. Carbon dioxide is readily soluble in water. According to Henry's law, if the pressure of carbon dioxide over water is increased, more of the gas than usual will be dissolved. The solubility varies in almost direct proportion to the pressure. For example, if the pressure is doubled, the solubility will be doubled. The solubility also varies with the temperature. The colder the water, without freezing, the more carbon dioxide will be dissolved. Consequently, by making variations in pressure and temperature, it is possible to control the degree of carbonation.

The degree of carbonation is measured in "volumes," not percent. At atmospheric pressure and at 50 degrees F., water will absorb an equal volume of carbon dioxide. To illustrate, one

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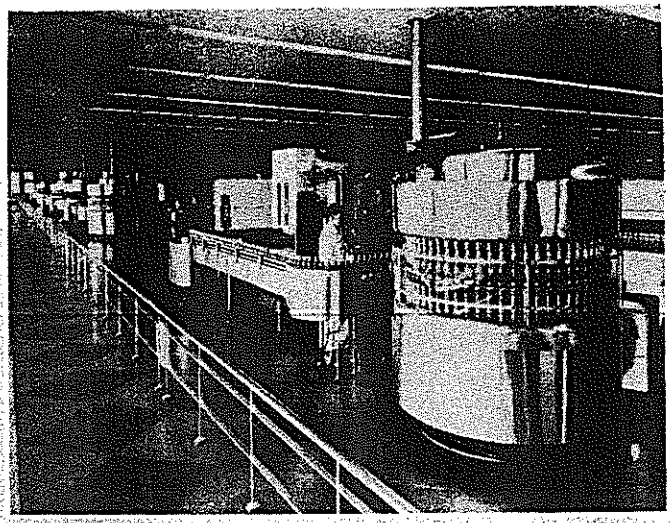
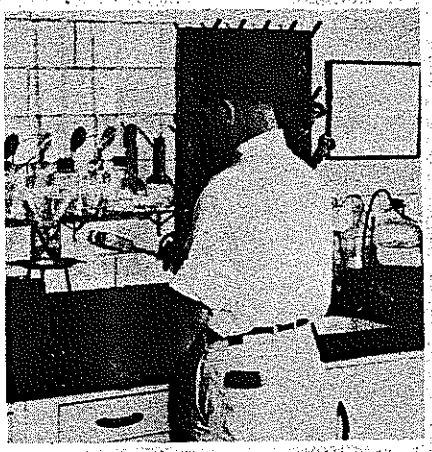
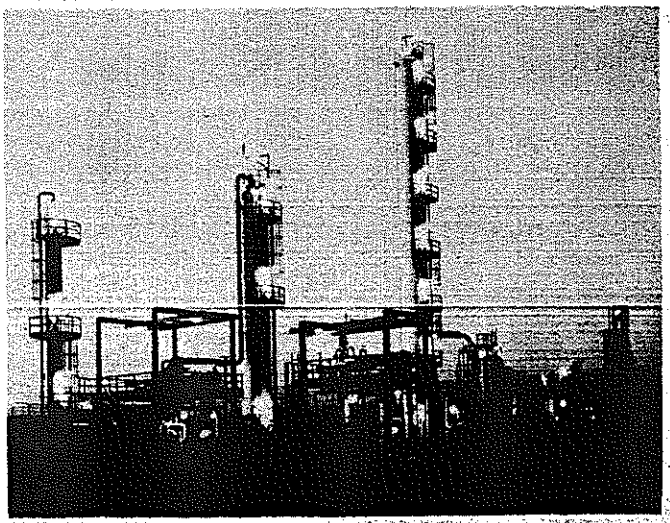


Behind the Scenes



THE MODERN bottling plant is immaculate. High speed, efficient operation produces thousands of bottles of soft drinks each day. The manufacturing and processing of carbon dioxide is also a major job in the soft drink industry.



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quart of water will absorb one quart of carbon dioxide gas. This is arbitrarily called "one volume" of carbonation. Water which contains three times that amount is said to have "three volumes" of carbonation, and so on. The type of drink determines the degree of carbonation. A few beverages contain no carbonation at all. These are called "still" drinks.

In this age very little carbonated water as such is consumed. It is usually mixed with flavoring and sugar to form the familiar carbonated beverage. Carbonation enhances the appearance and flavor of the drink. It causes that pleasant tingling sensation in the mouth. One little girl is said to have described it by saying, "It tastes like when your foot is asleep."

THE FLAVOR USED in some carbonated beverages is derived from real fruit juice or the pure extract from certain roots and herbs. In others it is an imitation. Sometimes a combination of natural and imitation is used.

The imitation flavors are the same as those used in confections, gelatin desserts, baked goods and numerous other food products. Imitation citrus flavors are ordinarily prepared from the peel oil of the respective citrus fruit. Other types of imitation flavors are usually intricate blends of various organic chemicals.

There is also a class of beverages which contain mixtures of several flavors (natural and/or imitation), one of which is rather outstanding. This class includes such beverages as cola, root beer, ginger ales, cream soda, etc. Of course there are numerous brands of each of these.

The amount of sugar in a carbonated beverage may range from as low as six percent to as much as 15 percent The most commonly used sugar is sucrose—regular table sugar. The sucrose is frequently subjected to a process known as inversion. This merely converts it into two other kinds of sugar, namely dextrose and levulose. The invert sugar is believed to have a more pleasing flavor when used in beverages.

A SMALL AMOUNT of acid is added to most carbonated beverages in order to give them a slightly tart taste. Phosphoric acid is used extensively in cola drinks. Organic acids like citric or tartaric are appropriate for most other flavors. All acids used in soft drinks are of the edible type. Many beverages also contain certified food colors and some contain small amounts of preservatives, antioxidants, etc.

A modern bottling plant, whether large or small, is a fascinating sight to behold. A special machine soaks the empty bottles in hot caustic which thoroughly cleans and sterilizes them. They are then automatically rinsed with fresh water until not a trace of caustic remains. Meanwhile, the carbon dioxide is converted from the liquid or solid phase into a gas. The water is cooled and carbonated using continuous process equipment. Another machine measures the exact amount of syrup (containing the flavor, sugar, acid, etc.) into each bottle. The carbonated water is then added. A limited amount of carbon dioxide is allowed to escape in order to expel any residual air from the bottle before the crown is crimped on. A unique machine thoroughly mixes the contents of each bottle, usually by turning it somersault. Of course, there are many other operations which must be performed in a bottling plant, like syrup making, water treatment, quality control, etc. Needless to say, perfect sanitation must be maintained at all times.

EVERY EXCHANGE AND commissary operator should make a diligent effort to visit each bottling plant which supplies his facility. This is especially important when located outside of the ZI. Observe the operations from start to finish paying extra attention to housekeeping and sanitation. You do not need to be a scientist to distinguish between the wholesome and the unclean. In a vast majority of cases, the manager will be pleased to show you through the plant because he is proud of the high standard which he maintains. However, if you should meet up with a bottler who

In addition to plant visitations, it is wise to keep an eagle eye on the product. Inspect, at various times, the beverages which are delivered to your station. See that the bottles and crowns are clean and inviting. Watch out for any extraneous matter which may be in the drink itself. Remember that carbonation alone is not insurance against spoilage. Any sign of "ropiness" in the beverage may be an indication that bacteria are present. Powdery sediment or lumpy material may be a sign of fermentation (and it's not good in this instance) or mold. The presence of objects like safety pins, suspender buttons, second-hand chewing gum and the like is the result of careless handling which is certainly not to be condoned.

LET US HASTEN to say that little or

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no trouble of this kind will be encountered if you are located in the better areas and if you deal only with high class concerns. A company which has spent many years building a good reputation and has tied up millions of dollars promoting a quality product cannot and will not take chances.

Recently, considerable interest has been displayed in canned carbonated beverages. The idea of canned drinks is actually not new, but only in the last few years have cans been developed which are considered satisfactory for the purpose. The cans must be constructed to withstand the necessary internal pressure and, in addition, they must be lined with a material which will resist the chemical action of the beverage.

Conservative beverage companies go to great lengths to work out their technical problems with the can manufacturers before marketing the beverages in cans. There is no general set of rules which can be applied to all situations. Each beverage produced by each company poses a separate problem and has to be considered individually. Sometimes it is necessary to alter the formulation of the flavor or to reduce the degree of carbonation. At other times, changes must be made in the can.

IN ADDITION, CERTAIN food colors are not satisfactory for canned products and must be replaced by other colors. Finally, extensive chemical and stability tests must be conducted on the product in order to insure shelf life. Reputable can companies are reluctant about selling cans to beverage houses which do not thoroughly work out their technical problems in advance.

Besides the technical problems, canned carbonated beverages have another drawback—that of cost. Under present conditions, it is difficult for disposable tin cans to compete locally with returnable bottles.

On the other hand, canned beverages do have desirable features which, on occasions, may outweigh the cost. The cans are much lighter than bottles and there is no bother with deposits and returns. The physical properties make it possible to ship canned soft drinks to exchanges and commissaries in remote areas where local bottling plants are nonexistant or do not meet sanitary requirements. Since the metal can conducts heat readily, the beverage may be cooled rapidly and economically. The can also excludes light rays and thus helps protect the flavor of some types of beverage.

It is too early to make accurate pre-

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dictions regarding canned beverages. It appears at this stage of the game that they will not make serious inroads into the bottling business. Yet the cans seem to be, in their own right, here to stay.

ANOTHER TOPIC OF the day is that of the low calorie beverage. Drinks of this type are intended primarily for "streamline-conscious" people. The rugged serviceman who gets plenty of exercise does not have to worry along this line because he burns up a lot of calories in his daily routine. However, some office workers and dependents with limited physical activity may cretae a demand for this special type of beverage.

Low calorie beverages are prepared in different ways. One way is merely to use the minimum amount of sugar possible to produce a satisfactory drink. This is one of the best ways because many people don't like their beverages too sweet anyway.

Another type of low calorie beverage is one which contains certain chemical sweeteners, either alone or blended with lesser amounts of sugar. The chemical sweeteners are exactly the same as those recommended by doctors for patients when sugar is forbidden. They do indeed impart sweetness to the beverage. It must be remembered, though, that these artificial sweeteners may not have the same flavor characteristics as real sugar. If the customer likes the special flavor characteristic, all is well. If not, he (or more than likely, she) would do well to favor the sugar type of beverage. After all, the amount of sugar normally consumed in soft drinks isn't great enough to be very unkind to the waistline.

A LARGE PERCENTAGE of the carbonated beverages sold tody are in bottles and cans. The individual serving is still by far the most popular; however, the king-size and large-economy-size are getting to be familiar terms in the beverage business.

When beverages are to be consumed on the premises some dealers prefer to use the fountain type dispenser. The carbonated water is supplied to the fountain via a pipe from a small carbonator which is set up in a back room. The flavored syrup is procured separately and mixed with the carbonated water at the moment of serving. The old familiar drug store type of soda fountain, while still in general use, is gradually yielding to a different kind of dispenser which automatically measures the exact amount of syrup and water, then mixes them as they flow into the drinking glass or, perhaps, the disposable paper cup. These dispensers are usually identified with well known brands of beverages which are also available in bottles.

ANOTHER TYPE OF dispenser that is rapidly making its way in the world is the coin operated vending machine. These machines dispense beverages in bottles, cans or paper cups. They are especially adaptable to locations where the customer likes to serve himself. In some places it may be more desirable to own and service your own vending machine. In other spots a service company can handle the details. There are many brands of coin operated vending machines available. Some have stood the test of time and earned excellent reputations. A few still have quite a way to go. Before installing any brand, be sure to carefully check the references.

By its very nature, the carbonated beverage is an excellent means for satisfying thirst.

Give the customer a fresh, high quality product with a familiar brand name. Merchandise it under clean, sanitary and appetizing conditions. Then you can rest assured that there will be plenty of repeat business.

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THE MILITARY MARKET